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Indian Standard

CODE OF PRACTICE FOR APPLICATION OF SPRAY APPLIED INSULATION

PART 1 MINERAL FIBRE

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 2

December 1988

Indian Standard

CODE OF PRACTICE FOR APPLICATION OF SPRAY APPLIED INSULATION

PART 1 MINERAL FIBRE

0. FOREWORD

0.1 This Indian Standard was adopted by the Bureau of Indian Standards on 10 May 1988, after the draft finalized by the Thermal Insulation Materials Sectional Committee had been approved by the Chemical Division Council.

0.2 The method of spray application of mineral wool and finishing the same is used for thermal insulation of irregular surfaces normally encountered in steam turbines. Also used for condensation and acoustic treatments in buildings, but these varied applications are beyond the scope of this standard.

0.3 Granulated mineral wool fibres either precoated with a suitable inorganic binder or binder applied separately are used for spray application. The spray insulation is applied by means of compressed air through a specially designed spraying machine.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of specified value in this standard.

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*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard prescribes the method of application and finishing of spray applied mineral wool to surfaces for use at temperature from 40 to 700°C.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 3069-1965* and those given below shall apply.

2.1.1 *Applicator* — An individual or organization undertaking spray applied insulation of the installations.

2.1.2 *Hot Side Temperature* — The temperature of the hot fluid inside the insulated surface under consideration.

2.1.3 *Thickness* — The thickness of insulation material only that is excluding any protective or other finish.

3. MATERIAL

3.1 The materials used for insulation shall conform to IS : 9742-1981†.

3.2 The applicator shall ensure that the thermal insulating and finishing materials are suitable for use at the operating temperatures and under the physical conditions stated by the purchaser, provided the material is supplied by the applicator. In case the purchaser or any other agency appointed by the purchaser specifies or supplies the material, the responsibility for the performance of such materials shall rest with the purchaser or supplier, as the case may be, and the applicator shall be responsible only for the workmanship. If the materials conform to the relevant Indian Standards, the applicator's responsibility shall be confined to the methods of application as stated in this code.

4. APPLICATION

4.1 General

4.1.1 All insulation materials should be applied so as to be in intimate contact with the surface to which they are applied.

4.1.2 The insulation shall be reinforced/supported when applied on vertical surfaces or on surfaces facing downwards like under-deck applications. Supports shall be cleats, studs, washers, nuts, bolts, lugs, pins or collars which shall be either welded to the surface or to bands which are then strapped round the surface. These supports serve to hold the insulation in place, prevent its slipping. In addition, they shall provide anchorage for lacing wire or wire netting which required to reinforce the insulation on finishing material. Depending on the function, supports shall either penetrate only partly through the insulation or protrude slightly beyond it. But in no case supports shall protrude through the final finish.

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*Glossary of terms, symbols and units relating to thermal insulation materials.

†Specification for sprayed mineral wool thermal insulation.

4.1.2.1 The purchaser shall indicate in his specification the type of supports and the agency which is to supply and fix them; and shall state whether welding will be allowed at site.

4.1.3 Stiffener angles, weld protrusions, ladder support insulation support rings, pipe hangers or any metal connections not otherwise scheduled to receive insulation shall be insulated if in direct contact with the hot surface. Thickness of insulation on such protrusions shall be not less than 50 percent of the thickness of the main system. The minimum extension of the insulation from the principal surface shall be equal to four times the insulation thickness of the main system.

4.2 Surface Preparation

4.2.1 Before application of spray insulation, the surface shall be wire brushed to remove all dirt, dust, rust, scale, shop paint, if any, etc. Any contamination due to oil/grease shall be removed with suitable solvent.

4.2.2 All austenitic stainless steel surfaces proposed to be insulated and subjected to an operating temperature of 250°C and above shall be painted with suitable heat resistant anti-corrosive paint before application of insulation.

4.2.3 Firm anchoring shall be welded on to the pads/strips provided on the body of equipment/casings.

4.2.4 Installation/construction of support framework shall depend on the total insulation thickness. Holding framework shall be such that it can take up vibration of the equipment. Supporting framework shall consist of distant lugs which shall be either welded on to cleats, studs, washers provided at the surface of the equipment or to bands which are strapped round the surface.

4.2.5 Whenever it is necessary to prevent ingress of oil/any liquid into the insulation, metallic or oil/fire resistance mastic protection is provided. A commonly featured provision is 2 mm thick aluminium sheet.

4.2.5.1 The studs shall be wrapped with suitable non-conducting material to avoid direct contact with wire-mesh.

4.3 Insulation Application

4.3.1 Application of spray-applied mineral wool insulation conforming to IS : 9742-1981* shall be in accordance with the manufacturer's specification and instruction. Application will be done by especially designed spraying equipment in consultation with the manufacturers.

4.3.2 The insulation shall be sprayed over the equipment at desired density up to thickness of 50 mm. After which a layer of galvanized wire netting of size 22 gauge × 20 mm or 20 gauge × 25 mm wrapped and tightened over the initial layer. Where layer interface is above 300°C, 316 stainless steel wire meshing and lacing shall be used. Reinforcing mesh shall be provided over each successive layer of 50 mm thickness of insulation to build up the total insulation thickness.

4.3.3 The self-setting/finishing cement conforming to IS : 9743-1981* shall be trowel applied all over the insulated surface with a first coat of 4/5 mm. The final coat of self-setting cement shall be applied after reinforcing fabric all around the insulated surface.

4.3.4 The surface shall be finally finished with a coat of fire and oil resistant paint.

5. MEASUREMENT

5.1 *See* 9 of IS : 7413-1981†.

6. INFORMATION REQUIRED

6.1 Purchaser shall provide the contractor with appropriate information on the following.

6.1.1 Relevant technical details (with drawings) of turbines, vessels, pipes, bends, flanges valves, hangers and other fittings.

6.1.2 *Thickness of Insulation in Each Area to be Insulated* — Where the applicator is required to calculate the thickness, the basis (given below) on which it is to be determined shall be specified by the purchaser:

a) Economic thickness,
b) Specified heat loss per unit dimension,
c) Specified temperature on the outer surface of the insulation,
d) Specified condition of fluid at the point of delivery, and
e) Any other such criteria.

In each case, purchaser shall provide the appropriate information required to enable the applicator to make the calculations.

6.1.3 Details of plant to be insulated including:

a) Location
    1. Indoors,

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*Specification for sprayed mineral wool thermal insulation.

*Specification for thermal insulation finishing cements.

†Code of practice for industrial application and finishing of thermal insulating materials at temperatures above 40°C and up to 700°C (*first revision*).

2. Outdoors but protected,
3. Outdoors exposed to weather, and
4. Difficult or unusual site conditions which will have bearing on transportation, scaffolding or whether protection.

b) Nature and material of construction of vessels to be insulated.

c) Dimension of surfaces. If these are adequately detailed in drawings, the provision of copies shall suffice. Otherwise information of the following nature is required:

1. Surface dimensions of vessels;
2. External diameters and lengths of pipes;
3. Number and type of fittings; and
4. Whether rotating or stationary.

7. TESTS

7.1 Tests for Thickness — Tests for the thickness shall be carried out after application. Local irregularities on the insulation surface shall be ignored.

7.1.1 If the arithmetic mean of not less than nine probe measurement at a given location is less than the minimum thickness as required by the purchaser or less than the commercial thickness offered by the applicator (subject to agreed tolerances) whichever is appropriate, the material applied at that location shall be deemed not to comply with this standard. Individual probe shall be ±15 percent or 6 mm, whichever is lower.

7.1.2 *Test for Bulk Density* — During application, a test panel shall be fitted on surface of equipment. When application of the equipment is completed, the test panel shall be removed and tested for bulk density. The gap that will be produced shall be filled up by spraying.

7.1.2.1 The number and location of these test panels shall be mutually agreed to between the purchaser and the applicator. However, minimum number of test panels shall be three.

7.1.2.2 Under no circumstances, material shall be cut out from the surface of equipment for checking bulk density.

7.1.2.3 The average bulk density shall not be beyond ±15 percent of the agreed value. However, none of the bulk density values at the test panels shall be below 25 percent of the agreed value.

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